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ABSTRACT

Serious budgetary and administrative questions concerning educational computing and technology confront liberal arts college administrators. What will be the impact of microcomputers and other technologies on a liberal arts education? Since monies are less and less apt to come from outside grants, especially for non-innovative institutions, and many computer companies have ceased offering major discounts or free equipment, where will funds originate? Will distributed computing, with downloading to microcomputers, make the typical computer center obsolete? How will colleges handle increasingly computer-literate students? Several colleges now have found that upwards of 80% of their freshmen will buy a personal computer from the school. In order to ensure compatibility and greater utilization, an official campus machine for students, faculty, administrators, and support staff should be selected. As more and more students and campuses become computerized, the potential software market will expand exponentially. This enormous market will drive the development of more and better truly educational software, ingenious software with interactive capabilities. The computer revolution will change all aspects of college life--instruction, classroom configurations, library use, campus communication, and institutional administration. Decisions must be made to ensure that dollars are spent for the right technology at the appropriate time. Education needs the gains in quality and quantity of work that computing and technology can bring. (JB)

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Present Place and the future of computing and technology on the college campus
Talk at EDUCOM Meeting, Austin, Texas, October 4, 1985

Introduction

Let me begin by saying a word about my background and my college. I am trained as a geochemist, and have been an on and off user of computers in my own work for 15 years. I have written a few programs, but that was some time ago; now I gratefully use word processors and spreadsheets. I am the President of a liberal arts college that has long had a strong program in science. In computing though, F&M until recently has been about average among liberal arts colleges. This fall, 80% of our incoming freshmen accepted our strong encouragement and purchased their own Macintosh.

My intent this morning is to show how one college president, with this background and at this kind of institution, views the present place and the future of computing and technology on the liberal arts college campus. Most of you know more about the details of computing than do I; your crystal ball probably is even more apt to reflect the future accurately. But, as they say, even a stopped clock is right twice a day! So here goes.

College trustees expect the President to present a budget that is appropriately frugal yet advances the college's aims; that requires deciding how to allocate funds for computing and technology. Even a decade ago on a liberal arts campus, few or no such funds had to be in the budget.

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Some trustees need educating as to why so much is necessary today.

Already computing and technology occupy several percent of college budgets, and it appears that before long they will claim at least as much as libraries have in the recent past: 5 to 7 percent. From where is that money to come? It is less and less apt to come from outside grants, especially for a college that likes to be an "early follower". Major companies do not beat a path to the door of the liberal arts college, offering major discounts, or better free equipment. It is said that one or two of the major research universities are even paid to accept equipment from vendors. Surely, to those at liberal arts colleges, that is an apocraphal story. The monies that we need must come either from redistribution of funds now going for something else, or from increased tuition charges, whose proceeds, of course also could have gone for something other than hardware.

An increasingly important question for me has to do with the style or mode of computing on our campus, and how it is to be accomodated within the organization. For example, we continue to wrestle with whether academic and administrative computing should be separate or united. What does it mean for the future of the Central Computing Center that one can now have a VAX on one's desk? Will distributed computing, with downloading to micros, make the typical computer center obsolete? Surely it will change its role, possibly to being the site of databases but not of CPU power. How does a

campus that is not technically sophisticated get the advice necessary to answer these sorts of questions?

A related question on a campus like mine is what to do about instruction in computer science. We offer several courses, at about the level of a minor. Should we have a major, or leave it to the universities? What will an undergraduate computer science major do in the future? If we decide to offer more, where do we find computer scientists to teach? We searched unsuccessfully all last year, and are continuing this year.

And what is the place, the style, the mode of technology more broadly? It seems clear that sooner or later all libraries will be fully automated; when and how, and at what expense, should it take place for us? When and how should a campus like ours network, and who should be on the network and on what schedule? What is the value of electronic mail to us, and are we ready to deal with its disadvantages, such as the potential absence of paper trails? How much is it worth it to connect one student with all other students? Will they merely establish a dating service and exchange obscene messages? Or worse, send one to me!

What about interactive video disks, will they be of great use, or go the way of the AV movement of 15 years ago that was supposed to revolutionize education but did not?

These are all management, planning, budgetary questions that surely are important. But those disciplines only provide the means to our end; they must not become confused

with the end itself, which is education--educating young people. What will be the impact of computing and technology on liberal arts education? How will they affect it, and how do we ensure that they make it better?

After all, I like to think of myself as an educator. I happen to enjoy technology, but the reason I espouse its greater place on our campus is because I know from my own experience that when used appropriately it can result in an increase in productivity and, often, in the quality of one's work as well. I want our students to have the benefits that the PC has brought to my work.

The deeper educational questions need attention, so that there is some kind of vision, some philosophy, that enlightens and informs our budgetary and planning decisions.

It is my personal belief that the impact of computing and technology on education will be remarkable. Some think it will prove to be of the same magnitude as the industrial revolution or the impact of the automobile on our society. Surely computing and technology will change education dramatically. And, if we do it right, they can transform it into something better.

Even to someone who is not an expert and whose crystal ball is murky (and who knows that those who use crystal balls will eat ground glass), this transformation seems inevitable. That is mainly because the cost of significant computing power has dropped so low that it is now only a small fraction of the price of a four-year college education, say, 1 part in

30, and it is continuing to drop. A useful personal computer costs no more--say \$250-\$500 per year--than a student's books, or, as Mr. Bennett would put it, their stereo. Especially on private college campuses, where students may have more money than on others, this means simply that the microcomputer is already too good a bargain to pass up. Students simply are going to have these machines whether or not their college does anything about it. We found last year that 20% of freshmen brought their own computer to campus with them, without any urging from the college. It is estimated that by the end of this year more than two million college students, one-fifth of the total, will own their own PC. A national survey showed that 50% of college freshmen had not only used a computer, but had written a program in high school. Several colleges now have found that upwards of 80% of their freshmen will, with only a recommendation, not a requirement, buy a personal computer from the school. This is accompanied by some grumbling from parents, but that will soon pass.

If colleges do nothing more than observe these freshmen arriving with their own, different machines, they will have the computing equivalent of a weed patch, from which the college and students collectively will derive no particular benefit. Many will decide that they would prefer a garden over a weed patch, and they will select one official campus machine that they will sell and repair, or for which they will act as agent.

Thus more and more students on our campuses will have their own computers, and sooner than we think we will be able to assume and act as though all of them do. Before that point, all faculty will have to have the official machine as well, and the college will have to help them get it, help them financially. We have found some of our more senior faculty uninterested even in a gift computer; the younger faculty, who wrote their thesis on a word processor, snap them up. As students see faculty using machines, they will be more apt to have their own, and vice versa.

If students and faculty have their own machines, administrators and departmental secretaries will not be far behind. In fact, some senior administrators may even be ahead! Once essentially everyone on campus has the same machine, or access to it, networking, and library automation would seem to be inevitable.

Thus my view of the near future is a campus in which everyone has their own computer or work station, and can reach everyone else, and the card catalog, through it. And of course they will be able to reach any other campus, and everyone on that campus, and not just in this country. To college presidents worried about campus protests, the notion of a nationwide electronic linkup of activist students gives pause and may evoke whatever latent tendencies toward being a Luddite one has!

As more and more students and campuses become computerized in this way the potential software market will

expand exponentially. This enormous market will drive the development of more and better truly educational software -- not CAI but ingenious software with interactive graphics. Sooner than we think some clever faculty member is going to become the Paul Samuelson of the college software market, giving further impetus to software development. It may occur in economics, perhaps, or statistics, or beginning mathematics. This all will be greatly facilitated as the Macintosh-like machines become easier to program, and the 3M work stations actually appear.

As Steve Gilbert and Brian Hawkins have urged, this new software will be accessible on-line. It will be easy for the prospective user to see a demo, to download the program electronically if it meets the need, and to be billed automatically. The new programs will be cheap -- costing no more than a textbook or a lab exercise, depending on their intended use. Making software no more expensive than current college materials is the only way to slow illegal copying in my opinion.

New storage media surely will have an important impact on education. Already one can buy an encyclopedia on a compact disk; as the demand and volume rise the disks and drives will get cheaper. Perhaps college textbooks will appear on CD; perhaps an entire curriculum, in economics, for example, with all the references one would need including the classic papers, will be available at a reasonable price on a single CD.

When micro-computers first became available they were touted as revolutionizing the home, though exactly how they were going to do so was left unclear. It hasn't happened yet. The wrong site was picked for the revolution; it isn't going to occur in the home; rather the campus. This will be true at liberal arts colleges as well as at the major research universities, though it will come later and be on a lower scale.

The revolution is going to change almost everything that we do. It will affect the traditional way faculty lecture, and make and grade student assignments. It will alter dramatically the way in which science labs are conducted. The automated library will be used in new and different ways. The teaching of writing has already changed and will change still more. The way we communicate with others on our campus will be different. The practice of administration has already been affected and will change much more. And it will all happen sooner than most of us would now predict.

All of us in this room need to be reminded that this future is terribly threatening to many on our campuses. There is a legitimate fear that the increasing use of computers and telecommunications will reduce the personal contact that is a large part of what the liberal arts colleges have to offer. Carrying the matter to a *reductio ad absurdum*, one can conjure up a vision of an evil future in which students never leave their rooms except to eat, faculty work only from their homes, libraries are empty and there is

no contact between people. No one will pay private college tuitions for anything that even begins to smack of that. Somehow we have to ensure that computing and technology enhances what we do best, and brings us together, not keeps us closeted, apart.

There is also the worry that machines may gradually and insidiously replace our intuition. Erich Bloch, a director of NSF, has said that engineering and science need an intuitive component--that operating with nothing but intuition is bad; but so is operating with none. This replacement of intuition may become more likely as the machines become more "expert" and do more and more for us.

Those who can look forward to to this new age, most of you, also may find it somewhat scary. We all know by now that computerization and technology generally do not save money; they lift expectations and the number and level of questions we try to answer, often requiring more staff and budget, not less. Even if students buy their own micro-computers, computing and technology are going to cost more than we would now estimate, and no obvious source of the money is in sight. For liberal arts colleges in the east, the need to make this new outlay will come during the very years of the baby bust, when our finances are going to be in even worse shape than in the days of stagflation, and when some colleges are going to fail.

I can see no farther in my crystal ball, and many more questions are raised than answered. My job as president is

not to have the answers, but to ask the right questions and to set the standard to which the answers must come up. First, I insist that we consolidate what we have started before we start spending too much time and money on the next phase, networking perhaps. In our case that means to make the Macintosh project work and work well. We will continue to try to be an early follower and to learn from others who have the resources to take more risks than we can afford. That requires that we keep abreast of developments elsewhere so that we know who and when to follow. I am just now getting a group of faculty and administrators together to continue to plan for the use of computing and technology, though in such a fast-moving area as technology Eisenhower's dictum that "a plan is nothing, planning is everything" is especially apt. We need help from major universities. EDUCOM can do a lot to educate us and to make it possible for us to get the help we need--to act as facilitator and educator.

We will have to make sure that the precious dollars that we spend go for just the right technology for us, at the right time. This is especially difficult in a field with rapid obsolescence, vaporware, and products and even whole companies folding almost overnight and others springing up. I am haunted by the recollection of having told the Director of Computing, not surprisingly it was at another campus, about a new, portable microcomputer which might be just the ticket for the campus. It was called the Osborne. For a

time, F&M was poised to select the PCJr! Colleges like mine simply cannot afford any mistakes in this costly area, especially since if we pick the wrong hardware we will either have to replace it or live with it; we will not be able simply to withdraw from the use of computing and technology.

So my job is to see that the best possible staff work is done to minimize the chance of serious mistakes and to ensure the maximum educational benefit. Education needs the gains in quality and quantity of work that computing and technology can bring, and the innovations. We expect people like those of you attending this meeting -- deans and vice presidents, computer center directors, faculty with special expertise -- to give us the most objective advice that you can.

Thank you.